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SOILutions

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GETTING YOUR NITROGEN ON TARGET

Ross H. McKenzie

With the high cost of fertilizer and concerns about fertilizers in the environment, we need to closely examine fertilizer application technology. Application methods that ensure efficient crop use of applied plant nutrients are double winners. Getting a larger portion of your fertilizer on target, in the plant, not only gives you the best return for your fertilizer dollar; it also keeps the fertilizer out of surface and groundwaters where it can be a problem.

A decade ago the big news was deep banding. Studies across the prairies showed that deep-banding nitrogen generally results in higher yields and increased fertilizer efficiency compared to broadcast-incorporation. Concentrated bands increased plant uptake of nitrogen and reduce immobilization and volatilization (gaseous) losses. Although banding has become standard practice, it does have its drawbacks mainly that it requires increased horsepower and energy requirements to get the band deep enough to be effective and can only be done prior to seeding.

A more recently developed approach to getting the fertilizer in the root zone for optimum nitrogen use is point-injection technology. In this approach, a spoked wheel injects liquid fertilizer into the soil at consistently spaced intervals. This technique offers the opportunity to place fertilizer below the soil surface prior to seeding with little soil disturbance. It also allows post-emergent or in-crop application during the early stages of crop growth with minimal damage to crops.

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SULPHUR ON FORAGE, AN ELEMENTAL CONCEPT

Elston Solberg

The average long-term leguminous hay yields from plots fertilized every second year with flowers of elemental sulphur (16 lbs sulphur per acre) is equal to or greater than plots receiving similar rates of sulphate sulphur. Further, this benefit carried over to the cereal crop following hay in the rotation. These conclusions were written 30 years ago after Professor John Toogood and his colleagues examined long term research data (1940-61) from the Breton plots. The elemental sulphur used in their work was, by today's standards, an inferior product, but it worked. More recent work with modern products confirms these ancient conclusions. Despite these findings, both new and old, there is still a great hesitancy among agronomists and farmers to either recommend or use elemental sulphur fertilizers.

Why does this hesitancy persist? Good products are available and have many advantages, but you need to manage them differently from other fertilizers to gain those advantages. Some research I have been involved in with Dr. Marvin Nyborg of the University of Alberta has shown us some of the management techniques you will have to adopt if you want to successfully use elemental sulphur. Although I will be writing about elemental sulphur on forages, much of the information is applicable to arable crops as well.

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Alberta
AGRICULTURE, FOOD AND RURAL DEVELOPMENT

Treatments used in the comparison of fertilizer application methods on spring wheat

Number	Treatment	Treatment Description*
1	Control	No nitrogen added
2	BC30+0	30 kg N/ha broadcast-incorporated before seeding
3	BC60+0	60 kg N/ha broadcast-incorporated before seeding
4	DB30+0	30 kg N/ha deep banded before seeding
5	DB60+0	60 kg N/ha deep banded before seeding
6	PI30+0	30 kg N/ha point injected before seeding
7	PI60+0	60 kg N/ha point injected before seeding
8	BC30+PI30	30 kg N/ha broadcast-incorporated before seeding plus 30 kg N/ha point injected post emergent
9	DB30+PI30	30 kg N/ha deep banded before seeding plus 30 kg N/ha point injected post emergent
10	PI30+PI30	30 kg N/ha point injected before seeding plus 30 kg N/ha point injected post emergent
11	0+BC30	30 kg N/ha broadcast post emergent
12	0+BC60	60 kg N/ha broadcast post emergent
13	0+PI30	30 kg N/ha point injected post emergent
14	0+PI60	60 kg N/ha point injected post emergent

*Ammonium nitrate (34-0-0) was used as the nitrogen source in broadcast and deep banded treatments and urea ammonium nitrate (28-0-0) was used for point injection.

Nitrogen on Target Continued

All three technologies; broadcast-incorporation, banding, and point-injection; have their advantages and disadvantages. At Alberta Agriculture, Food and Rural Development in Lethbridge, we have been conducting a study over the past three years to evaluate the different placement methods. Our goal is to determine which are the most effective under differing environmental conditions.

We conducted our field experiments from 1990 through 1992 using spring wheat. At Foremost, in the Brown soil zone and at Lethbridge and Claresholm in the Dark Brown soil zone we ran experiments on both summerfallow and stubble. We also had an experiment on stubble at Pincher Creek in the Thin Black soil zone in 1992. The different treatments we used are listed in Table 1.

On all our fallow seeded sites soil test nitrate-nitrogen levels were over 90 lb/ac in the 0 to 36 inch depth and we didn't see a nitrogen response under those conditions. Soil nitrate-nitrogen levels in stubble sites were low to medium at all locations except Foremost in 1990. Spring wheat responded to nitrogen fertilizer at all our stubble sites. The response to time and method of nitrogen application varied among sites and years, reflecting differences in soil types and climatic conditions.

Factors influencing the response included seedbed moisture, precipitation received between seeding and the five leaf stage, and drought stress during the growing season. Generally, precipitation was near normal in 1990, below normal in 1991 and above normal in 1992 at all locations.

Local conditions also influenced the outcome of the experiments. For example, hail at Lethbridge reduced yields in 1990. In 1992, snow and frost between August 21 and 24 reduced crop yields and quality at all sites.

After three years, our data suggested that the effectiveness of an application method depended largely on soil nitrogen level, seedbed moisture conditions at the time of seeding and precipitation amounts between time of seeding and the tillering stage.

When seedbed moisture conditions were poor, preplant banding and point-injection treatments resulted in higher yields than broadcast-incorporated treatments. When seedbed moisture was good to excellent there was little difference among the nitrogen methods. However, at the 60 kg N/ha rate the preplant broadcast treatment yielded less than deep banded or point injected treatments for all nine

site years. Generally, both the deep-banded and the point injected treatments performed equally well at the 60 kg N/ha rate. The point injected treatments tended to slightly out perform deep banded treatments in situations where deep banding resulted in rougher and drier seedbeds.

Splitting applications between preplant and post emergent or applying all the nitrogen as post emergent generally did not produce higher yields than applying the same amount as preplant. There were a few exceptions. At Lethbridge in 1992, and Claresholm in 1990 and 1991, split application treatments gave slightly but not significantly higher yields than preplant application treatments. The application of all nitrogen post emergent produced the highest yields at Claresholm in 1990 and 1991. At some locations, yields were significantly lower in treatments receiving a post emergent application due to crop stress from a lack of N and from physical injury during the fertilizer application.

Averaged across sites and years, we found that preplant banded and point-injected N treatments produced about the same yield. Although there is no yield advantage, point injection does reduce draft requirements by fifty to sixty percent compared to banding to the same depth. This offers considerable saving through energy conservation. Point injection also minimizes soil disturbance and maintains surface residue. Both factors are important for producers interested in conserving soil by reducing tillage operations.

Our study showed that splitting nitrogen application rates or applying all nitrogen after seeding can achieve yields equal to applying all N prior to seeding under certain conditions. Point injection technology will allow you to flex your fertilizer application strategy in response to weather conditions during seeding. For example, wet conditions in some years may prevent you from banding nitrogen before seeding. Other years poor soil moisture conditions may cause you to cut back your nitrogen rates. The post emergent capabilities of point injection systems would allow you to respond to these situations after the crop is in the ground. In the first case, you can go ahead and seed as soon as you can get on the field and come back and apply your nitrogen after emergence. In the second case, you can respond to improved moisture conditions after you have seeded by adding extra nitrogen.

Like all technologies there is a downside and delaying N application until after seeding involves some risks. Prolonged wet weather may prevent you from getting on the field until after the five leaf stage resulting in nitrogen stress and crop yield reduction. Also post emergent point-injection overlaps with your herbicide spraying operation and this can lead to a time management problem.

Point injection has many advantages and may become a common practice over the next decade. Right now the selection of commercially available point-injection equipment is limited. The spoke wheel equipment currently available has various mechanical problems which still need to be overcome. The engineers are working to design a wheel with a longer life and a hub that will accurately and simply control the application rate. Another disadvantage is that the liquid fertilizer (28-0-0) used for point-injection is more costly than some other products. This has to be weighed off against the increased flexibility and reduced energy requirements. If engineering problems can be overcome, we may soon see spoke wheel application equipment that uses anhydrous ammonia, a much cheaper N fertilizer source.

To sum up, point injection is an emerging technology with the promise of increasing flexibility in the timing and rates of fertilizer application and reducing energy requirements without significant changing yields. Properly managed, it could be an efficient and effective method for application of nitrogen to spring wheat and likely other crops as well.❍

CANOLA-CHEMICALS-JAPAN

What's the connection? When we export canola to Japan, we may also inadvertently export pesticide residues. The Japanese are sensitive about what comes in to their food chain with imported human and animal foods. They currently list maximum allowable residue limits for forty-one agricultural chemicals and the Japanese Ministry of Health and Welfare is working on limits for approximately another sixty.

What does this mean for Alberta canola producers? It doesn't mean you should abandon your chemical control practices. Rather it means take care with what you apply to your canola crops. With today's extremely sophisticated detection equipment one bad apple can spoil the whole barrel. Follow the label directions carefully and avoid experimenting with new pesticides or tank mixes before they have been registered. Pay close attention to timing. Some pesticides have cropping restrictions such as *do not apply within sixty days of harvest.*

For canola, there are residue limits for twenty-seven pesticides on the current list of forty-one. Canola that fails to meet regulatory standards may be refused entry or may be devalued. It's interesting to note that glyphosate (Roundup), which was registered last year for preharvest use on canola, is on the Japanese list.

Does this mean pre-harvest Roundup is a no no in canola? Not at all. Research on preharvest use of Roundup has shown that application when grain is below 30 percent moisture content, typically seven to fourteen days before harvest, at the recommended rate will keep residue on the crop well below the Japanese guidelines.

In today's competitive international marketplace, markets are hard to come by and hard to keep. A little extra attention to detail with respect to pesticide use will help keep the customer satisfied and help keep Alberta canola and canola based products flowing into the Japanese market.

❑

PHOSPHORUS PROJECT - SECOND YEAR UPDATE

Ross H. McKenzie
Soil Fertility Specialist

In 1991, Alberta researchers began a three year project titled "FIELD EVALUATION OF LABORATORY TESTS FOR SOIL PHOSPHORUS" to examine the need for phosphate fertilizer across Alberta. The primary objective was to evaluate when spring wheat, barley and canola will respond to phosphate fertilizer. A number of different soil test methods are being used to correlate plant available phosphorus (P) levels with crop response to added phosphate fertilizer. The information will be used to develop predictive models for each soil test method and recommendations on which tests perform best on the different soil types found in Alberta.

Researchers involved in the project include Ross McKenzie, who is project manager (Soil and Crop Management Branch, Alberta Agriculture, Lethbridge), John Harapiak and Norm Flore (Westco Fertilizers Ltd., Calgary), Doug Penney and Elston Solberg (Soil and Crop Management Branch, Alberta Agriculture, Edmonton), and Garry Coy (Field Services, Alberta Agriculture, Fairview). Dan Heaney is coordinating laboratory analysis and Len Kryzanowski is the group's statistician.

This is the first time in over 20 years that a province wide project has looked at the need for phosphate fertilizer. The need for phosphorus in crop production has long been recognized. Prairie soils are very low in naturally occurring phosphorus containing minerals. However, many agronomists are of the opinion that phosphorus has been accumulating in soils over the years because fertilizer additions have been larger than crop removals.

In 1991, 78% of wheat sites, 89% of barley sites and 82% of canola sites responded to added phosphate fertilizer. In 1992, 89% of wheat sites, 96% of barley sites and 77% of canola sites responded to added phosphate fertilizer.

The fact that over 75% of the sites responded to phosphate fertilizer in the past two years means that its use is still necessary for many farmers. However, we know that environmental conditions such as soil moisture and temperature can play a major role in whether or not crops will respond to added phosphate fertilizer. It will be very interesting to see if similar results occur in 1993.

In 1992, the project received funding from the Alberta Agricultural Research Institute, Western Grains Research Foundation, Canola Producers Commission, Sherritt Gordon, Cominco, Westco and the Potash and Phosphate Institute. All are supporting the project again in 1993.

Overall, the first two years of the project produced very interesting results and was very successful. Responses to phosphate fertilizer observed early in the growing season were realized in the final grain yield. We are optimistic that after three years of province wide field studies, we will be able to give farmers much better advice on when and how much phosphate fertilizer to apply.☎

SOIL COMPACTION

Jerome Lickacz

Many farmers are wondering if the larger tractors and combines used today are compacting the soil and consequently reducing crop yield. Research by Agriculture Canada at Lethbridge and the U of A at Mundare indicate that loads greater than 5 tonnes per axle can result in compaction.

In both trials, trucks and/or tractors were driven over the soil. In the Lethbridge trial, the compacting process was followed with regular soil tillage. Subsoiling and zero till treatments were also included in the experimental design.

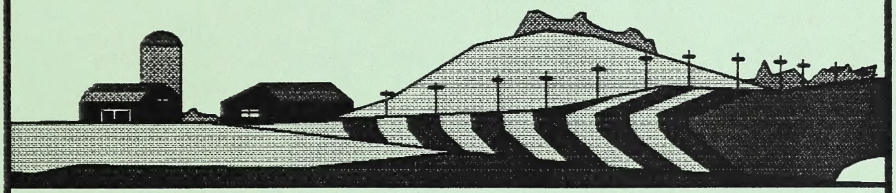
Although soil compoaction was measurable, yields were not reduced. It can only be assumed that the compaction achieved was below that required to restrict rooting and subsequently decrease yield.

The ability of the soils in this study to carry a load without comapcation reducing yield may arise from soil organic matter. Organic matter imparts a resilient characteristic to a soil. It can be compared to a sponge which will compress when a force is exerted on it and then regain its former size when the force is removed.

The cone penetrometer has been developed to assist extension staff and industry agronomists when assessing the suitability of a soil for deep tillage. The one limitation has been that there is insufficient calibration of penetration resistance to crop yield. To hopefully shed a bit of light of this subject, the Soil and Crop Management Branch established two trials last fall.

In these trials the topsoil was removed and the soil was compacted with a jumping jack to achieve four levels of compactness. In the check treatment, the topsoil was removed and then replaced. Samples for moisture, bulk density and a variety of physical and chemical tests were obtained prior to replacement of the topsoil. One trial was located on a Black Chernozem near Calmar and the second on a Dark Gray Luvisol near Thorsby. These trials parallel a study by Richard Johnson at the Alberta Environmental Centre. I am optimistic that the combined results will provide better guidelines for deciding when deep tillage is a viable option.❑

31st ANNUAL ALBERTA SOIL SCIENCE WORKSHOP 1994



PLENARY SESSION THEME :
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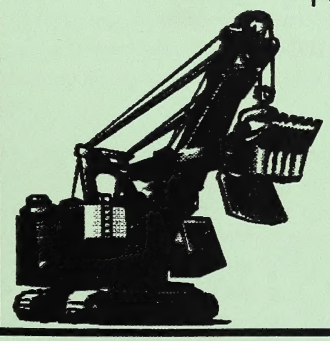

CALL FOR PAPERS AND POSTERS

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fax (403) 453-7360

This is a call for Papers and Posters for the Volunteer Session of the 31st Annual Alberta Soil Science Workshop. The theme of the workshop Plenary Session is "Integrated Soil Management".

POSTERS

The poster session will begin in the morning of February 23rd, 1994 and posters may be left in place until the afternoon of February 24th.

PAPERS

Volunteer papers will be presented in the afternoon of February 23rd. The number of volunteer papers is limited. Speakers are allotted 15 minutes for their presentation and questions. If you wish to present either a paper or poster on a soil-related topic, please submit a 200 word (or less) abstract by November 19th, 1993 to:

Len Kryzanowski, Chairman
1994 Alberta Soil Science Workshop
c/o Soil & Crop Management Branch
Alberta Agriculture
9th floor 6909 - 116 st
Edmonton, Alberta
T6H 4P2

STUDENT COMPETITION

Once again, this year's workshop will include an award for student oral presentations. Please indicate on your abstract if you wish your presentation to be included in this competition.

The organizing committee reserves the right to select volunteer papers and posters from among those submitted. The committee tries to maintain a policy of one presentation per author. Additional presentations by an author will be considered if space is available.

Please circulate this call for papers and posters to give all interested parties the opportunity to participate.

Len Kryzanowski

Len Kryzanowski, P.Ag.
Chairman
1994 Alberta Soil Science Workshop

WEED CONTROL FOR DIRECT SEEDING

Bill Chapman
Regional Crop Production Specialist

Recent trends to direct seeding and minimum tillage have changed our weed and volunteer crop control practices. Adapting these new techniques to your farm take time, practice and patience - patience can be especially hard to come by when your every move is being scrutinized by the neighbours. But not to worry, each new farming practice sharpens your management skills. Weed control is no exception, the main objective is to get on top of your weeds early before an infestation steals your profits.

Weed populations change as a layer of crop residue builds up on the surface. Reduced soil disturbance will affect weeds differently. Some require tillage to germinate while others don't. Wild oat populations will be higher in some years than in others due to moisture, but general trends should be downward over the long term. Switching to direct seeding takes away the option of using pre-emergent herbicides. Pre-emergent use without incorporation is being investigated, but the verdict is still out. Happily, there are more post-emergent choices for wild oats than ever before. All those choices might be a bit confusing at first, but with the evolution of herbicide resistant wild oats on the prairies, herbicide rotation will be a key factor in long-term control. Think your selections through for a seven to ten year period making sure you are rotating through chemicals with a different mode of action not just a different brand name.

You should see an immediate drop in green foxtail populations following a switch to direct seeding. Banding or seed-placing fertilizer rather than broadcasting reduces the competitiveness of green foxtail.

Perennial and volunteer crops are more difficult to control under direct seeding. For example, alfalfa in a rotation gives you the benefits of having a deep rooted legume, but it is harder to control when recropping to annuals. Roy Button's research in Melfort, Saskatchewan showed that an early second cut followed by 1 L/acre of Roundup tankmixed with 0.66 L/acre of 2,4-D or 0.12 L/acre of Banvel will kill alfalfa with six to ten inches of regrowth. An alternative tank mix is 1L/acre Roundup with 0.38 L/acre of Lontrel and 0.98 L/acre of 2,4-D Ester. The Roundup also provides control of any quack grass in the stand.

Dr. Neil Harker recently reported that you need to spray Roundup when the quack grass is actively growing for optimum results. He insures the grass is growing by measuring the newest leaf with a ruler. Harker suggest spraying alfalfa stands in early August to allow for breakdown of legume root mass and some recharge of soil water. In Harker's work, a follow-up treatment of Estaprop at 0.7 L/acre controlled escapes in cereal crops the year following alfalfa.

A few producers have tried to spray out their alfalfa in the spring without much success. While we don't have a lot of research data on this subject under Alberta conditions, results with no-till corn following hay or pasture showed that spring growth drew down soil water reserves and any escapes were very competitive with the crop. Generally, spraying out forage stands in the fall as opposed to spring resulted in higher corn plant populations, higher yields and lower production costs.

As I mentioned any mistakes will be noticed by the neighbours, but you can usually do a fix-up with spot spraying. A small quad mounted system works well for this. It also works well if you want to get serious with canada thistle along the fence lines and tree rows. You may have to treat more than once, but the cost of spot spraying is only a fraction of what it costs to spray the whole field.

Successful weed control in direct seeding is best achieved through a flexible combination of cultural and chemical controls. For example, foxtail barley is a problem weed when reduced tillage is used in the brown and dark brown soil zones. Yet it can be easily controlled by tillage. So why not be flexible and use tillage instead of trying to control with high and expensive rates of herbicide. A little flexibility in your system may make you more profitable.

Crop rotation also plays an important role in weed control. Rotating broadleaf crops like canola, flax or peas with cereals reduces the impact of problem weeds. An example is stinkweed, which is easily and cheaply controlled in cereals but is not so easy to manage in canola. Good stinkweed control in your cereal crops will reduce the problem in the following canola crop. In a similar manner, good canada thistle control in this year's cereal or canola will reduce the effects and lack of chemicals on next year's peas.

It is critical to watch the labels as information is constantly changing and manufacturers update their registrations. For example, repeated application of Assert on cereals grown on gray wooded soils was observed to restrict pea or canola growth in the following year. Ken Kirkland at the Agriculture Canada research station at Scott, Saskatchewan confirmed this observation. The label now recommends against applying Assert two years in a row. Alberta Agriculture's annual publication "Crop Protection with Chemicals" is a good reference source for keeping up with changes in herbicide recommendations.

If you are really worried about herbicide carry-over into a sensitive crop, Denise Maurice of Soil and Crop Management Branch recommends planting a test strip of the sensitive crop in the year prior to seeding the entire field.

Probably the most important practice for good weed control in direct seeding is good straw and chaff management. Even spreading of residues eliminates the piles and rows that will cause hair-pining and uneven stands the following year. Poor emergence in residue rows and piles makes for a poorly competitive crop and these areas are very prone to develop serious weed infestations. Once the straw and chaff is on the ground its very hard to go back and get it evenly distributed. So manage your straw or it will manage you.✓

Table 1. Brome Yields and Forage Nitrogen:Sulphur Ratios for 1981 and 1982.

Fertilizer Source		Brome Yield		N:S Ratio of Brome	
Nitrogen	Sulphur	(tons per acre)		less than 15 is good	
(100 lbs N per acre)	(10 lbs S per acre)	1st year	2nd year	1st Year	2nd year
None	None	0.5	1.0	12	10
Urea	None	0.5	1.4	33	20
None	Sulphate	0.8	1.1	8	8
Urea	Sulphate	1.9	2.3	13	10
Urea	Urea S	1.4	2.4	25	12
Urea	Fine S	1.4	2.4	30	14

Urea S: 100% of the elemental S particles are less than 50 micons in diameter.

Fine S: 67% of the elemental S particles are less than 150 microns, 11% less than 50 microns in diameter.

Sulphur on Forages Continued

Comparisons of sulphate fertilizers; such as ammonium sulphate, 21-0-0-24; with elemental sulphur has often led to the conclusion that the latter is an inferior product. I believe this conclusion is arrived at primarily because the research has been short-term (1-2 years) and the application techniques inappropriate. We have long known that elemental sulphur needs to be converted (oxidized) by soil microbes to the sulphate form before it can be taken up by a plant. This takes time. Sometimes this time is referred to as the 'lag period'. The length of the lag period depends on the particle size of the elemental sulphur and the method of application. Whether or not elemental sulphur has been applied to the soil before can also have an effect, but it's a minor one.

Our research has shown that surface broadcast is the best method of application. It promotes quick oxidation especially if the applied fertilizer contains elemental sulphur particles less than 150 microns in diameter. (There are 1000 microns in a millimetre, so we're talking small). If the particles are larger than 150 microns then the conversion to sulphate is

Fig. 1. Brome Yields from Annual Applications of Urea-S and Fine-S Relative to Sulphate.

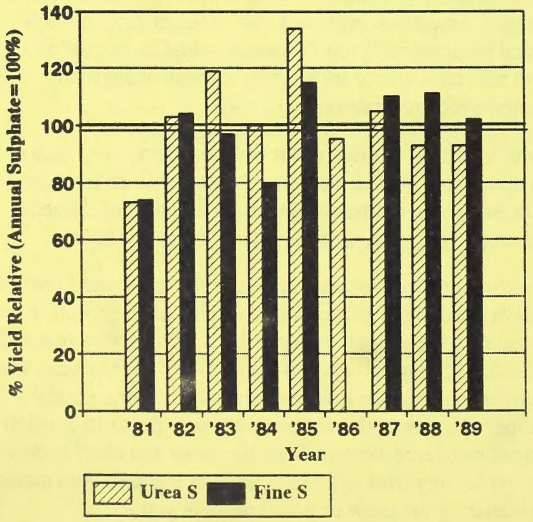
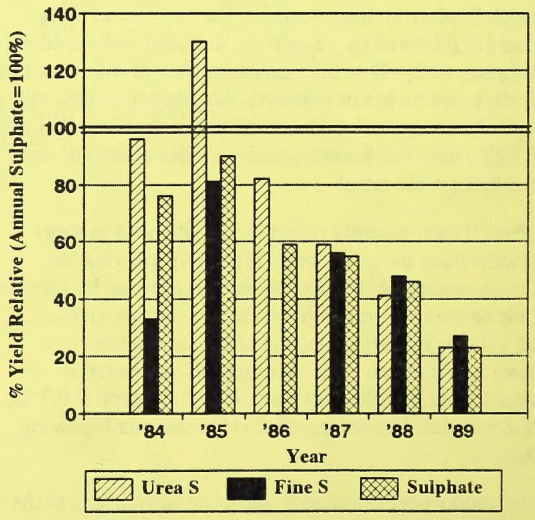


Fig. 2. Brome Yields from Residual Urea-S, Fine-S, and Sulphate Relative to Annual Sulphate.



slower. Results from long-term research where elemental sulphur was applied to a bromegrass stand clearly showed a one year lag period (Table 1). In the first year of the experiment, yields were increased by both elemental sulphur fertilizers but the increase was not as great as with the sulphate fertilizer. A high ratio of nitrogen to sulphur in the forage also indicated that the sulphur supply was insufficient. (Nitrogen to sulphur ratios greater than 15:1 result in poor animal performance.)

By the end of the second year, yields were comparable among sulphur sources. Only the fine sulphur treatment stood out with a significantly greater nitrogen to sulphur ratio compared to the other treatments. This was probably because it has a larger particle size than the other elemental sulphur product and thus oxidation to plant available sulphate is appreciably slower.

Excluding the first year of the experiment both elemental sulphur fertilizers performed well relative to sulphate (Fig. 1). In general, the elemental sulphur treatments tended to produce larger yields in wetter years and perhaps slightly lower yields in drier years compared to the sulphate based fertilizer. In wet years there tends to be leaching losses of sulphate. In the elemental sulphur treatments only that portion which has been converted to sulphate would be subject to leaching losses while all of the added sulphur in the sulphate treatments is susceptible to leaching.

Reduced leaching losses is one advantage of elemental sulphur fertilizers. Another is their residual availability. In 1984, after three years of fertilizer application, the treatments were split in half to examine the residual availability of the sulphur fertilizers. Over the next three years, yields in the residual urea sulphur treatments were very similar to those from the treatments still receiving yearly applications of sulphate (Fig. 2).

Reduced leaching losses and residual availability provide two levels of sulphur insurance for forage crops grown in areas of relatively high rainfall. The grey wooded soil zone of central Alberta has some of Alberta's most sulphur deficient soils. It also has a high forage production potential in terms of moisture availability (excepting the drought of the past few years) so elemental sulphur is generally well suited for use in this area. I encourage producers to take a second look at elemental sulphur fertilizers to see if they can harness some of its unique advantages in their forage programs.

JUST HOW LOW ARE SOIL NITROGEN LEVELS?

Crop growth has been excellent over the past summer and hopefully this will mean high yields this fall. In much of Alberta things look good for next spring. Particularly in southern Alberta, where stubble fields already have good moisture and this year's summerfallow fields have excellent moisture.

For producers considering reducing fertilizer inputs next year, high yields and heavy nutrient draw down this year and good fall moisture imply that nitrogen reserves won't be adequate (especially in stubble fields) for next year's crop. That means higher rates of nitrogen fertilizer will be required to maintain crop production levels next year.

My best guess is that 80% of 1993 stubble fields will probably have less than 25 lb nitrogen/acre in the rooting zone. But don't rely on guesswork. I strongly advise farmers to soil test their fields to determine the exact levels of nitrogen, phosphorus and other nutrients. Even nutrients such as sulphur may be low. Soil sampling some of your typical fields is the only accurate way to determine soil nutrient levels. Why not get a head start on next spring's work by soil sampling this fall.

When soil sampling here are a few points to keep in mind:

❖Poor soil sampling techniques will produce unreliable results and questionable recommendations.

❖If you cannot afford the time to sample all fields, consider sampling 3 or 4 per year on a rotating basis.

❖Collect fifteen to twenty cores from each field taking care to avoid any small unusual areas.

❖Large areas of the field with different management histories, for example manure applications, should be sampled separately.

❖I strongly encourage depth sampling at 0-6, 6-12 and 12-24 inch depths. Labs are capable of handling depth samples and the small extra charge incurred for measuring nitrogen and sulphur at depth is certainly worth it in terms of the extra information you receive.

❖Once the sample has been collected, preserve it by air drying on a clean sheet of plastic or refrigerating, no more than three days, prior to delivery to the lab. If you have doubts about how to store and ship samples, contact your soil testing lab prior to sampling.

❖Take the time to fill out the information sheet when submitting the sample. Previous crop, crop to be grown, legal location, previous fertilizer or manure management, and special management problems are essential information for formulating a fertilizer recommendation.

With accurate soil test information, you can make informed decisions while planning your fertilizer management strategy for next year. One option is to apply some of your fertilizer this fall. With our good moisture, soils should work up well with the fertilizer applicator, and there is plenty of crop residue on the land to prevent soil erosion after a banding operation. Soil conditions are ideal this fall for application of nitrogen fertilizers - liquid, granular or anhydrous.

Continued Page 8

Low Nitrogen Continued

For producers considering fall fertilizer application here are a few of my rules of thumb:

✣Fall banded nitrogen may be more effective than spring-banded nitrogen when lack of seedbed moisture is a concern.

✣If you don't get test results back in time, apply a conservative N rate, say 75% of what you expect to apply. This conservative rate is a hedge against such things as high nitrogen test results, low spring moisture or low crop prices. If conditions look favourable in the spring, additional nitrogen can be drilled-in with the seed.

✣Have your fertilizer formulated to meet the nutrient requirements on an individual field basis.

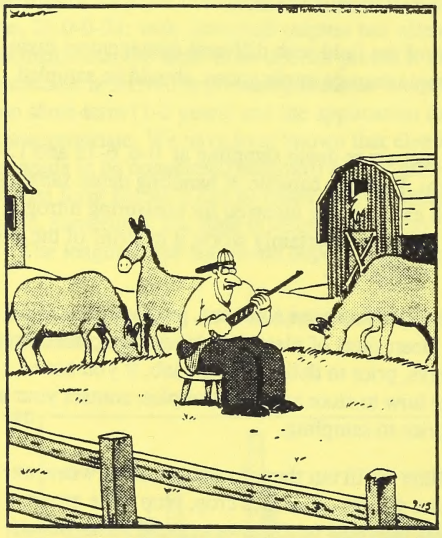
✣Band don't broadcast. Banding restricts the contact between soil and fertilizer reducing overwinter losses.

✣Band later in the fall rather than earlier. Although this is not likely to be an issue with this year's late harvest, late banding reduces losses between application and seeding time.

✣Consider time management as part of your decision on when to fertilize. Fall applications cut down on work in the busy spring season.

I always suggest that farmers get several opinions before making a final decision on a fall fertilizer program. If you decide not to fertilize this fall or simply don't have the time, you should at least get your soil sampling done this fall. Then you will have time over the winter to make your fertilizer plans for next year. By the way, if you need some help with soil test interpretation, feel free to give me a call at 381-5126 in Lethbridge, or call Len Kryzanowski or Dan Heaney in Edmonton at 427-6361.

Ross H. McKenzie, Soil Fertility Specialist
Soil and Crop Management Branch, Lethbridge



Misunderstanding his dying father's advice, Arnie spent several years protecting the family mules.

"The way to get things done is not to mind who gets the credit of doing them."

Benjamin Jowett

"Do what you can, with what you have, where you are."

Theodore Roosevelt

Herbicide Resistance Workshop

Want to know more about herbicide resistance? Whether your a researcher, field agronomist, extension specialists, or a producer this comprehensive workshop will bring you up to speed on who's who and what's what in herbicide resistance. In addition you'll have a chance to voice your views on what you see as the problems and possible solutions during round table strategy sessions.

The workshop will be held at the Edmonton Hilton, December 9 and 10, 1993. Registration fees are $95. For more information contact Denise Maurice by phone 403/427-2530 (RITE 147-2530) or fax 403-427-0133, or John O'Donovan by phone 403/632-8208 or fax 403/632-8379.

SOILutions is published three times a year by the Soil and Crop Management Branch, Alberta Agriculture, Food and Rural Development. Your comments on current contents, ideas and contributions for future articles are welcome. For further information phone, fax, or write *Dan Heaney*, Soil and Animal Nutrition Laboratory, 905 O.S. Longman Bldg., 6909-116 st, Edmonton, Alberta, T6H 4P2, Phone (403)427-6361, Fax (403) 427-1439 **OR** *Elston Solberg*, Soil and Crop Management Branch, Agonomic Research Unit, 6909-113 st, Edmonton, Alberta, T6H 4P2. Phone (403) 427-2530, Fax (403) 427-0133.